Forest Site Management Section

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SILVICULTURE NOTE 11

FINAL REPORT

SX TRIAL 87-202-Q

FERTILIZATION OF INTERIOR SPRUCE (SX) AT THE TIME OF SOWING MCKALE CREEK, SEVEN-YEAR RESULTS

Introduction

Fertilization at the time of sowing (FAS) has been considered as one possible way of alleviating planting check of Sx. The technique is more cost effective than FAP because the treatment is done at the nursery months before the trees arrive at the site. This trial examines the effects of two different FAS fertilizers and five different application rates and formulations on the outplanting performance of Sx seedlings.

Sites

The McKale Creek test site is located south of McBride in the Robson Forest District (Figure 1). The trial is in the very wet, cool Sub-Boreal Spruce biogeoclimatic zone (Table 1). FAS was prescribed for this site as a means of minimizing vegetation competition.

FIGURE 1. Location of McKale Creek FAS trial.

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TABLE 1. Site conditions for McKale Creek FAS trial

Site conditions and history	
Biogeoclimatic zone	SBSvk
Site series	(04) SxwFd–Knight's plume
Moisture/Nutrient regime	3–4/C
Logged	1986
Site preperation	Slashburned 1987
Planted	1988

Species and Stock Type

The trial used Sx 9309 PSB313A 1+0 spring-planted stock. At the time of planting the unfertilized seedlings averaged 18 cm in height and the seedlings that had been fertilized at sowing averaged about 21 cm in height.

Treatments

There were twelve FAS treatments involved in the trial (Table 2). Although these treatments were regarded as long-term in 1987, many nurseries have since adopted some of these FAS schedules as routine operational procedures to provide nutrients to seedlings during nursery culture. The exact FAS recipes used vary depending upon nursery, species and crop cycle.

The application rate delivered to each seedling was very small in relation to the conventional broadcast fertilizer application rate of 32g N/seedling recommended by Brockley (1988). All seedlings were fertilized in the nursery as well as receiving the FAS treatment. The products used all have different release characteristics and different forms of N. Osmocote™ is an ammonia-N fertilizer with a hard resin coating that releases the fertilizer by rupturing. Nutricote™ is a nitrate-N fertilizer with a soft resin coating through which the fertilizer dissolves. The release of the fertilizer for all of these products is mediated by moisture and temperature. The duration of the release is the length of time the fertilizer takes to leave the prill, not the length of time it takes before the fertilizer is initially released. Fertilizer is released immediately upon sowing. The expected duration of release is determined under laboratory conditions for specific temperatures and moisture content.

Results

All seedlings, regardless of fertilization treatment, displayed planting check in their first and second growing season, growing less than 10 cm over a two-year period. The growth in the third year was only 10 cm.

Survival

Although there were no statistically significant differences between the various FAS treatments and the unfertilized control, there was a tendency for the highest fertilizer rates in both Osmocote™ and Nutricote™ to have lower survival (Figure 2). Overall, however, survival was acceptable.

TABLE 2. FAS treatments used in McKale Creek FAS trial

Treatment	Fertilizer rate in nursery (kg/m³)	Formulation	Duration (month)	Fertilizer rate (g/tree)	N rate (g N/tree)
Control					
Osmocote™	6.5	17-7-11	12	0.39	0.07
Osmocote™	13	17-7-11	12	0.77	0.13
Osmocote™	20	17-7-11	12	1.19	0.20
Osmocote™	30	17-7-11	12	1.79	0.30
Osmocote™	40	17-7-11	12	2.38	0.40
Nutricote™	7.3	14-14-14	12	0.43	0.07
Nutricote™	14.6	14-14-14	12	0.87	0.12
Nutricote™	20	14-14-14	12	1.19	0.17
Nutricote™	30	14-14-14	12	1.76	0.25
Nutricote™	40	14-14-14	12	2.38	0.33
Osmocote™	6.5	18-6-12	9	0.39	0.07
Nutricote™	7.3	16-10-10	6	0.43	0.07

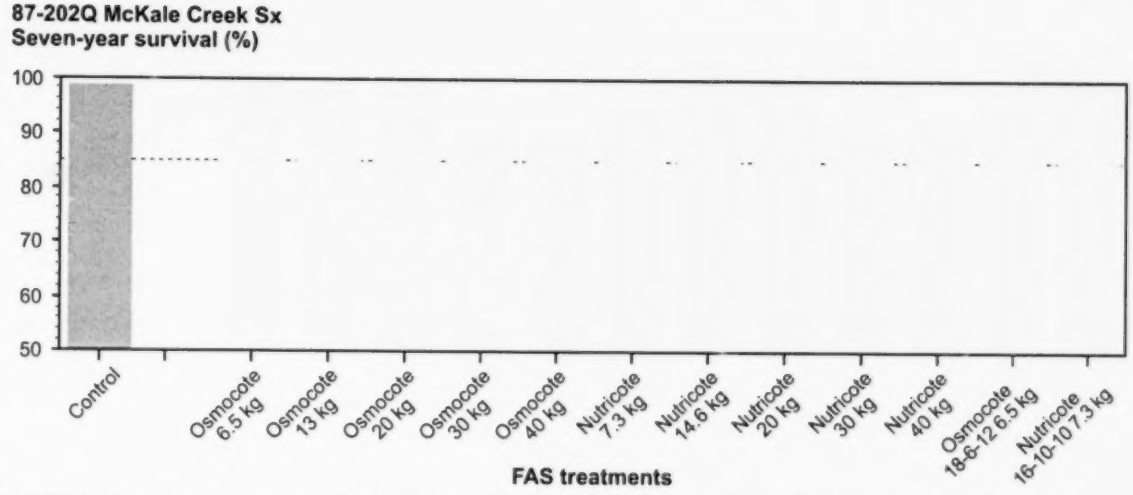

FIGURE 2. Seven-year survival of FAS treatment combinations at McKale Creek. The horizontal line at 85% is a reference line of silviculturally acceptable survival.

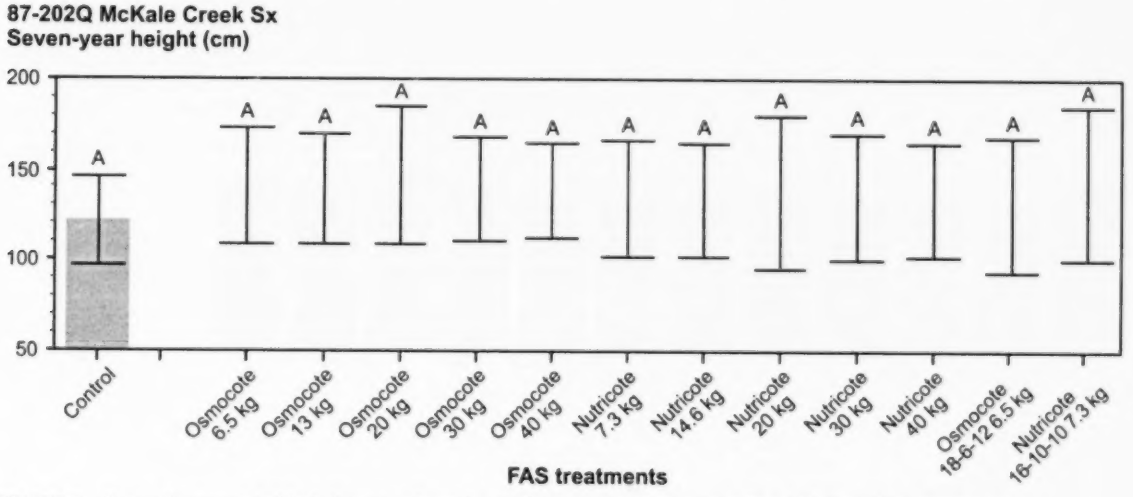

FIGURE 3. Seventh-year total height growth and standard error of the mean for different FAS treatment combinations at McKale Creek. Treatment means marked with the same letter are not considered statistically significantly different at a probability of 5%. The error bar about the mean seven-year height is the standard error of the mean.

Height Growth

Although there was excellent survival, there was a pronounced planting check for the first two years after planting. During these first two years, the annual height increment was only between 5 and 6 cm. After seven years, although there was a 5 to 10 cm difference in height between the FAS treatments, it is not considered statistically significant and is of no practical significance (Figure 3). The FAS treatments were more variable than the unfertilized controls, but the difference was not considered statistically significant. The increased variability of the FAS treatments was possibly due to inconsistency in incorporating fertilizer at sowing. Higher fertilizer rates tended to be more variable than lower fertilizer rates. The nitrate-N source Nutricote™ had the poorest growth — a trend seen in other FAS trials. Within each fertilizer source, the 20 kg FAS rate seedlings were slightly larger than the other rates. It is interesting to note that the treatments with the best growth also had the best survival.

Conclusions and Recommendations

FAS did not appear to have any benefit in alleviating planting check, nor did it provide any lasting effect in improving survival and increasing growth. The fertilizers used in this study were only rated as 12-month duration under warm, moist nursery cultural conditions. Due to this release duration and the very small application rates used in a two-year crop cycle, it is unlikely that there was any significant amount of fertilizer left at planting.